

FOUR CASES OF HEMATOMYELIA: WITH A BRIEF DISCUSSION OF THE ETIOLOGY.¹

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HEMATOMYELIA, or spinal hemorrhage, is a sufficiently unusual condition to justify the report of cases from a purely clinical aspect and at the same time so much variation of opinion appears to exist as to the probable causation of spinal apoplexy that additional data in regard to this aspect of the problem is definitely valuable.

It was originally designed to report the following four typical instances of hematomyelia with complete microscopic studies of the tissues, and for this purpose the spinal cords were carefully segmented and fixed. Through an unfortunate occurrence the entire collection of tissues was lost and with it the notes detailing the gross appearance of each segment. For this reason it is now only possible to discuss these cases from their clinical and etiological stand-points, but these appear to be of sufficient interest to justify the writer in presenting them.

CASE I.—Pilot, aged forty-six years. Had measles when young; malaria off and on for fifteen years. Gonorrhea sixteen, and syphilis twenty years ago.

Spasmodic drinker of beer, whisky, or anything convenient, sometimes drunk every other day. Chews and smokes. Has been always pretty well, save for several minor accidents.

Present Illness. Drank heavily all day, slept very well that night. Went into the saloon the next morning for a bracer. While seated in the rear room he suddenly lost himself and did not rouse until he waked in the alcoholic wards of Bellevue Hospital. Total motor and sensory paralysis below the arms, incontinence of urine and feces. Marked and increasing priapism. Paralysis ascended quite rapidly to arms.

Temperature fluctuated irregularly from 96° to 104°. Pulse rate also varied greatly, not corresponding with temperature curve but ranging from 56 to 120. Respiration entirely diaphragmatic, from 12 to 26, without reference to temperature or pulse. Pulmonary and cardiac status practically normal.

Complete loss of sensation, of temperature, pain, and touch, with complete motor paralysis below level of third dorsal nerves. Patellar, cremasteric, abdominal, and wrist reflexes entirely lost. Incontinence of feces and retention of urine.

After a few days there was some regain of sensation and power in the arms and shoulders. Mentally he became perfectly clear.

¹ Read by title before the meeting of the Association of American Physicians, Washington, D. C., May 11, 12, and 13, 1915.

Patient finally sank into a comatose condition and died twenty-three days after the hemorrhage.

Autopsied by permission and on the assurance that only the spinal cord would be examined. A large terminal acute and an old hemorrhage was found involving the cervical and lower dorsal segments. The hemorrhage had followed down the ventricle of the cord, infiltrating out thence into the gray matter. The columns seemed to be free from the lesion. Spinal vessels sclerosed.

CASE II.—J. C., salesman, aged sixty-seven years. Had "bilious" and typhoid fevers in 1865. One attack of gonorrhea. Syphilis denied. Two heat prostrations. Has drunk very moderately. Good and regular habits.

While driving his horse on the speedway he became suddenly dizzy, turned his cart, and collided with another vehicle. Was thrown out, landing on shoulders and head. He remained unconscious for about five minutes during which he was carried to the subway and was met by an ambulance.

Examination showed no voluntary motion below the shoulders. All reflexes below the nipple line were absent. Sensation markedly decreased above this zone. Touch perception present but markedly dulled along the ulnar distribution on both arms. Sensation of heat and cold lost. The paralysis is perfectly symmetrical. There is a small contusion over the sacrum but none elsewhere.

Respiration is entirely diaphragmatic; thorax does not move at all. Forced respiration extends to sternocleido and scaleni muscles. Temperature, 98.4°; pulse, 80; respiration, 24. Very marked continuous priapism.

On the second day the patient developed first a posterior congestion of the base of both lungs succeeded by pneumonic consolidation. Urine and feces incontinent. The mentality became entirely normal; the priapism disappeared.

Seven days after onset the lung status had nearly cleared, but the slight contusions and abrasions of the skin failed to heal, and showed signs of trophic ulceration. Slight movement of the chest muscles became then apparent and the movements of the upper extremities became more improved and better correlated. Slight reflex, after pricking the plantar surfaces of the feet, appeared. Bowels less incontinent. Chest clearing.

Apparent improvement continued until nine days after onset, when quite suddenly the patient became very cyanotic and unconscious. Pulse slow and very feeble; pupils contracted; deviation of left eye; Cheyne-Stokes respiration; complete relaxation of muscles of the extremities; early death.

The autopsy was performed by permission a few hours after death. The muscles of the paralyzed extremities showed the early evidences of atrophy. Except for the contusions mentioned, there was no evidences of traumatism, no fractures or evidences of

intradural hemorrhage. The arteries and veins of the spinal arachnoid showed some congestion, especially in the upper cervical regions. They were moderately sclerosed.

There was a moderate general softening and a dilated ventricle from the medulla to the sixth cervical segment. Here the gray matter was soft and hemorrhagic and the dilated ventricle was filled with a bloody, grayish, pasty material. The seventh segment showed complete blood infiltration of the gray matter. In the eighth segment the hemorrhage was most marked and had a fresh appearance, especially in the posterior horns. In the first dorsal segment the hemorrhagic softening was very marked in the horns, mostly in the posterior, but in the lower half of the segment it was chiefly confined to the left crescent of the gray matter. In the second dorsal segment the softening was entirely confined to the left crescent, more in the posterior horn, but becoming less and less in the lower levels of the segment. The third dorsal segment showed the same changes in lesser degree, but with general congestion of the bloodvessels.

From this level down to the seventh dorsal there was very little disease, but here the ventricle and its adjacent tissue showed a hemorrhagic softening. The eighth segment showed a simple dilated ventricle without hemorrhage. Blood again appeared in the ventricle at the level of the tenth dorsal segment with the usual extravasation outward. A small psammoma was found attached to the posterior root, on right side, just as it was given off from the cord.

There was a small hemorrhagic area in the left posterior horn of the second lumbar segment; another such area was found located near the ventricle. The third lumbar segment showed a very similar condition. The same was found in the fourth lumbar segment, but the sacral levels showed no changes aside from a general congestion. The cauda showed no gross disease.

The brain showed practically nothing except for isolated patches of slight arachnoid thickening and congested and sclerosed bloodvessels. No hemorrhagic foci were found on gross examination. The arteriosclerosis, which is evidently of long standing, showed moderate calcareous changes.

The basal ganglia showed nothing, and careful sectioning of the pons, cerebellum, and medulla failed to demonstrate any gross abnormalities.

Examination of the general viscera was limited by the terms under which the autopsy was obtained. In so far as studied they showed no lesions of importance except a patchy, pneumonic consolidation, apparently resolving and a chronic interstitial with an acute parenchymatous nephritis. The general bloodvessels showed extensive sclerosis.

CASE III.—A marble cutter, married, aged forty years. Had measles when a child. Fourteen years ago had a gonorrhoea. Denies lues.

Five weeks ago had an attack of vertigo which lasted about one week. Nine days ago, while at South Beach, the patient went to stool; being constipated he strained very hard. When he attempted to get up he found that he had lost control of his legs. He had burning pains from the thighs down until three days ago, since which he has experienced shooting pains but twice. His bowels have not moved, and he has to be catheterized. Patient has recently been working in a damp house; to this he attributes his trouble. He has been an inveterate user of tobacco, and has been moderately alcoholic.

He is well nourished, tongue slightly coated, appetite good, bowels constipated. Physical examination of the chest is negative. There is loss of sensation and motion below both knees. Imperfect sensation (heat, touch, pain) of lower one-third of thighs, scrotum, and arms. Cremastic and patellar reflexes, also ankle clonus, absent. Muscles of calves flabby; no priapism at present. Temperature, 98°; pulse, 90; respiration, 24. Mental status entirely normal.

Patient was put to bed, and in addition to general treatment was given daily massage of the paralyzed extremities. At the end of eight days he was moving the legs slightly, but he had developed a trophic ulcer over the sacrum. Sensation was greatly disturbed, but present in some degree even in the legs; distribution did not seem to be constant. Constipation was still very marked and drastic measures were required to induce movements. Cystitis no better.

Thirty-four days after admission he had regained control of the sphincters in large part, but atrophy of the involved extremities was steadily increasing. Cystitis and the bed-sore became progressively worse. He sank into an apparently septic condition, and died forty-one days after admission, fifty days after the acute onset.

The autopsy was performed eighteen hours after death.

Body extremely emaciated. Extreme atrophy of both legs, especially of the anterior tibial groups. No atrophy of the muscles of the upper extremities or of the thorax or abdomen.

The heart showed brown atrophy; the aorta marked endarteritis, but without calcification. Aortic and mitral segments thickened. The large vessels of the abdomen showed moderate endarteritis. Lungs showed emphysema and cavitation in the apices, apparently tuberculous, but no longer active. The liver was fatty. The kidneys showed marked chronic interstitial and fatty, with parenchymatous changes. The renal arteries showed marked endarteritis. The bladder showed ulcerative cystitis.

The second to the sixth inclusive posterior spinal processes were bifid. The vessels of the spinal canal showed extreme congestion,

especially in lower dorsal and lumbar regions. They showed moderate sclerosis. The spinal dura was normal. The first evidence of spinal disease was found at the first dorsal level, manifested by a small area of softening in the left anterior horn. At the level of the fifth dorsal segment the entire gray matter was soft and infiltrated with blood. In the mid-dorsal region the anterior horns appeared to be almost universally softened. In the lower lumbar region the softening had so generally involved all structures as to convert it into an unrecognizable mass.

The direct cause of death was sepsis originating from a large trophic ulcer over the sacrum or from the cystitis.

CASE IV.—The patient entered the fourth medical service of Bellevue Hospital unable to give any personal history, and the few details obtained were given by her neighbors.

She was twenty-five years old, supposed to be in good health, and no previous illnesses were known of. She was known among her neighbors as a hard drinker and as of liberal morals. Two days previous to her entrance to the hospital she complained of some headache. On the succeeding day she still suffered, and during the morning drank a quart of whisky. In the afternoon she felt considerably better, but at about 6 P.M., while at stool, she noticed that her feet and hands were becoming numb. She was taken to the hospital on the next day. Absolute anesthesia and paralysis of the lower extremities, abdomen, and, to a lesser degree, of the thorax also, together with slight involvement of the upper extremities. The paralysis and anesthesia rapidly extended upward, and she died before her physical examination had been completed.

The autopsy was performed early the next day, the body having meantime been preserved by efficient cold storage. The external examination of the body revealed nothing except that the pupils were irregularly dilated. The condition of the body indicated involuntary evacuations of feces and urine.

Examination of the spinal canal was only permitted. A large amount of clear colorless cerebrospinal fluid was found, and the vessels of the channel, including those of the spinal dura, were found much congested and considerably sclerosed.

Gross examination showed involvement of the spinal gray matter alone. It was found to be the seat of an acute hemorrhage, softening extending from the cervical levels downward. Apparently the hemorrhage had progressed along, and mostly, if not entirely, through the medium of the ventricle of the spinal cord.

One factor which all of these instances possess in common is that in each, definite disease of the spinal bloodvessels was present. In Cases I and IV syphilis is thus, in all probability, the chief determining factor, and in Case II age is apparently of most definite bearing, though this example also presents the only instance of a possible traumatic factor. Case III represents as the most likely

agent concerned in the production of arterial disease the excessive use of tobacco and alcoholism, which is also a factor in Cases I and IV.

These facts are in direct contraversion to the commonly accepted text-book statement. Thus Church and Peterson state that the changes in the arterial coats are of lesser importance in spinal hemorrhage, and E. Farquhar Buzzard, in Osler's *System* (vol. vii, p. 274), makes the statement that sclerotic changes in the vessels do not appear to very generally determine the lesion. The author is impressed from the statements made by most authors that cases have not been adequately investigated as to this possibility, which is of acknowledged importance in every other type of hemorrhage. It would appear to the writer that spinal hemorrhage in this characteristic in no way differs from hemorrhage elsewhere, and that it is especially similar to brain hemorrhage.

The statement is made by some authors that spinal hemorrhage customarily takes place in a previously existing area of softening. Though it is impossible to absolutely exclude this possibility, at least it seems highly improbable, for in the cases thus reported any lesion of sufficient size to favor such a condition could not long exist in so limited and vital a territory as the spinal cord without producing symptoms of an obvious character. Such signs are entirely wanting in these cases. Eichorst, in 1874, recognized that central hemorrhage might take place in previously normal cords, and in all probability this is the rule and not the exception.

As to the immediate determining factor, Buzzard states the most frequent to be trauma or strain, and Church and Peterson seem impressed with the idea that arterial pressure and direct cardiac impulse which play so important a role in brain hemorrhage are absent or unimportant matters in spinal hemorrhage. The writer's impressions from a study of the literature of the subject and from these 4 cases is that precisely similar factors are at work here as in cerebral hemorrhage, but obviously under conditions varying from those dominant in cerebral hemorrhage. Thus, for example, we find cerebral hemorrhage occurring most frequently in conditions of mental strain, and in all except Case II of this group a definite factor of primary spinal stress was present. Straining at stool was apparently the immediate cause in two of my cases. Oppenheim cites a case occurring during the manual of arms drill. Gowers mentions a case occurring after excessive coitus, and so on.

Traumatism is mentioned by most authors as an important factor in the cause of spinal hemorrhage. One should exclude in this discussion those instances in which actual crushing of the cord occurs, since the lesion in true hematomyelia is one of gray matter hemorrhage only and is quite distinct from that which might occur in direct spinal injuries. In only one of these four instances is a possible traumatic factor concerned, that is in Case II. It must,